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EXAMINER

BORLINGHAUS, JASON M

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**BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES**

Application Number: 10/781,805
Filing Date: February 20, 2004
Appellant(s): SUBBU ET AL.

Peter J. Rashid
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed 5/26/09 appealing from the Office action mailed 10/29/08.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

7,155,423	Josephson et al.	7-1998
WO 02075650	Yao	3-2001

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claim Rejections - 35 USC § 101

35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

Claims 27-36 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter. The claims are drawn to a process. For a process to amount to patent eligible subject matter, it must (1) be tied to another statutory class (such as a particular apparatus) or (2) transform underlying subject matter (such as an article or materials) to a different state or thing. The process of claims 27-36 does not meet either of these requirements.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 27-54 are rejected under 35 U.S.C. 103(a) as being unpatentable over WIPO Publication Number WO 02/075650, inventor Yao (hereafter "Yao"), in view of US Patent No. 7,155,423 to Josephson et al. (hereafter "Josephson").

In regard to claim 27, Yao discloses a method for multi-objective problem solving using evolutionary algorithms, said method comprising:

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- randomly drawing an initial population of individual solutions that are generated from an archive by using a combination of linear programming and sequential linear programming algorithms using a computing device (see claim 1);
- passing the initial population of solutions through a dominance filter to identify a non-dominated subset of parent solutions (see claim 1 ; pages 16-22);
- committing the non-dominated subset of parent solutions to a non-dominated solutions archive; randomly combining matched pairs of parent solutions to create offspring solutions (see pages 16-22);
- passing the offspring solutions through the dominance filter to identify a non- dominated subset of offspring solutions (see pages 16-22);
- combining the non-dominated subset of parent solutions with the non-dominated subset of offspring solutions into a larger set of solutions (see pages 16-22);
- passing the larger set of solutions through a non-crowding filter to identify a reduced subset of solutions in order to create a new population of individual solutions fro the reduced subset of solutions, and updating the solution archive with the new population (see pages 32-36);
- repeating the above steps for a plurality of generations (see claim 1); and
- passing the updated non-dominated solutions archive through a dominance filter to generate an interim efficient frontier having at least

three dimensions, the frontier being used to make problem solution decisions (see claim 1).

Yao does not explicitly disclose the problem sought to be solved as the optimization of a portfolio, wherein the solutions in the population are potential asset allocations.

Josephson discloses a system and method for multi-criteria decision making, wherein said system and method are used for portfolio optimization in investment decisions based on competing objectives and a plurality of constraints (see e.g. col. 4, lines 15-19), wherein said method analyzes an initial population of solutions for potential portfolio allocations (see col. 4, lines 8-19). It would have obvious to one of ordinary skill in the art of multi-objective problem solving to use the method disclosed by Yao to solve the portfolio optimization problem disclosed by Josephson. It was well known in the art at the time of the invention to use evolutionary algorithms and dominance filters as disclosed by Yao to solve many problems having multiple objectives, including portfolio optimization problems. The motivation for using the method of Yao to solve a portfolio optimization problem would be the same as when the method is used to solve any multi-objective solution: to find pareto-optimal solutions from among an initial population of potential solutions.

In regard to claims 28-31, Yao further discloses the subset of parent solutions having a first cardinality, the offspring having a second cardinality that is different than the first cardinality (via mutation), the larger solution set having a third cardinality that is

equal to the first cardinality plus the second cardinality, and the subset having a fourth cardinality that is less than the third cardinality (see pages 16-22).

In regard to claim 32, Yao discloses repeating the disclosed steps until convergence is achieved (see claim 1).

In regard to claim 33, it is inherent within the teaching of Yao that when the reduced solution subset has a fourth cardinality, the new population of solutions will be exactly equal to the reduced set of solutions if the fourth cardinality is equal to the initial population.

In regard to claim 34, Yao further discloses the reduced subset of solutions having a fourth cardinality, wherein the new population of solutions is created by randomly drawing additional solutions from the archive if the fourth cardinality is less than the initial population of solutions (see pages 16-22).

In regard to claim 35, Yao further discloses the reduced set of solutions having a fourth cardinality, wherein the new population of individual solutions is created by randomly discarding individual solutions from the reduced subset of solutions if the fourth cardinality is greater than the initial population of solutions (see pages 16-22).

In regard to claim 36, Yao further discloses the new population of individual solutions as created by randomly injecting individual solutions from the archive until the fourth cardinality is equal to a desired number of solutions (see pages 16-22).

In regard to claims 37-54, the claims are deemed unpatentable in view of the combination of Yao and Josephson as applied to claims 27-36 above. It would have

been obvious to one of ordinary skill in the art at the time of the invention to embody the method disclosed by Yao in a system or on a computer readable medium.

(10) Response to Argument

§101 Rejection

Appellant argues that Claim 27 satisfies the requirements established under §101, specifically the machine-or-transformation test established in *In re Bilski*, 545 F.3d 943, 88 U.S.P.Q.2d 1385 (2008).

First, Appellant argues that Claim 27 is tied to another statutory class as Claim 27 contains claim language consisting of "randomly drawing an initial population of individual portfolio allocations...**using a computing device.**" (emphasis added).

Appellant acknowledges that based upon recent decisions "[n]ominal recitations of structure in an otherwise ineligible method fail to make method a statutory process." *In Ex parte Langemyr* (Bd. Pat. App. & Inter. 2008) citing *Gottschalk v. Benson*, 409 U.S. 63 at 71 – 72 (1972). Specifically, Appellant acknowledges that "insignificant extra-solution activity will not transform an unpatentable principle into a patentable process. This means reciting a specific machine or a particular transformation of a specific article in an insignificant step, such as data gathering or outputting, is not sufficient to pass the test" citing *Memorandum from John T. Love to the Technology Center Directors dated January 7, 2009*.

However, this is exactly what the Appellant desires, to claim utilization of a computing device for data gathering or specifically for “randomly drawing an initial population” for utilization in further step.

The entire claim limitation states "randomly drawing an initial population of individual portfolio allocations that are generated from a portfolio allocations archive by using a combination of linear programming and sequential linear programming algorithms using a computing device". However, there is no claim language indicating that computing device is performing the linear programming or sequential linear programming algorithms, as the claim limitation is merely actively reciting the drawing of information and then is merely defining the pool that such information is being drawn from (information generated by using linear programming and sequential linear programming).

Second, Appellant argues that when Claim 27 “is viewed as a whole ... it is **impossible** for the human mind to perform the complex plurality of steps recited in independent Claim 27.” Examiner takes exception to the Appellant’s claim, especially as the Appellant has not provided any rationale or evidence for his assertion of impossibility.

Admittedly, performing the recited method without the aid of an electronic device would be tedious and time-consuming. However, Examiner does not believe that it would be impossible for the human mind, perhaps aided by a pad and pencil, to perform the complex plurality of steps contained in Claim 27. What in particular in the algorithm could not be done by a human? For, if the computing device is performing logical or

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mathematical operations in each step, what is actually beyond the ability of a human except the speed at which the calculations are being performed?

Third, Appellant argues that Claim 27 transforms the underlying subject matter to a different state or thing, specifically that the data stored within the archived is being transformed via updating. *In re Bilski* stated that "[p]urported transformations or manipulations simply of public or private legal obligations or relationships, business risks, or other such abstractions cannot meet the test because they are not physical objects or substances, and they are not representative of physical objects or substances." *In re Bilski* at 1399.

In Claim 27 there is no physical transformation of subject matter but rather transformation of information, an abstraction, into a new updated status. Such is not a transformation of subject matter.

Furthermore, Appellant attempts to define the term "archive" through its usage within the computer science arts (e.g. magnetic tape) thereby requiring the importation of a computer system. However, during examination, "claims ... are to be given their broadest reasonable interpretation consistent with the specification, and ... claim language should be read in light of the specification as it would be interpreted by one of ordinary skill in the art." *In re Bond*, 910 F.2d 831, 833 (Fed. Cir. 1990). However, in examining the specification for proper context, the examiner will not at any time import limitations from the specification into the claims. *CollegeNet, Inc. v. ApplyYourself, Inc.*, 418 F.3d 1225, 1231 (Fed. Cir. 2005). Construing claims broadly during prosecution is not unfair to the applicant, because the applicant has the opportunity to amend the

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claims to obtain more precise claim coverage. *In re Yamamoto*, 740 F.2d 1569, 1571 (Fed. Cir. 1984).

However, there is nothing within the claim language or the specification to require such an interpretation, as an archive could just be a paper archive such as a notebook or a file cabinet.

§103 Rejection

Appellant argues that the prior art fails to teach or suggest drawing a sample from an archive “using a combination of linear programming and sequential linear programming algorithms.”

Yao states:

In the conventional approach to filter design, it is necessary to linearise the constraints which will actually excludes some stable designs. In other words, part of the feasible search space are excluded from being considered by the conventional approach. Furthermore, because an objective in the form of the ‘minimize maximum value’ cannot easily be linearized, the optimization is actually done using the weighted smallest quadratic error over the whole function. That is, what was optimized is not entirely the same as what should be optimized. The conventional algorithm might well miss good designs that have a larger weighted square error, but a lower maximum error. (see pp. 46 – 47).

Yao discloses or, at least, suggests drawing a sample from an archive using a combination of linear programming and sequential linear programming algorithms (linearized optimization).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified Yao and Josephson by incorporating generation of a sample through usage of a combination of linear programming and sequential linear

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programming algorithms, as disclosed and/or suggested by Yao, thereby optimizing the samples utilized for the portfolio allocation.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

/Jason M Borlinghaus/
Examiner, Art Unit 3693
July 29, 2009

Conferees:

/J. A. K./ James A Kramer
Supervisory Patent Examiner, Art Unit 3693

Vincent Millin/vm/
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